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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/727,713	11/28/2000	Robert M. Zwicker	DELTA-2k01	7512

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EXAMINER

SUNDARAM, T R

ART UNIT	PAPER NUMBER
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2858

DATE MAILED: 03/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/727,713

Applicant(s)
Robert M. Zwicker

Examiner
T. R. Sundaram

Art Unit
2858



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1 is/are allowed.
- 6) ☒ Claim(s) 2-4 and 10-15 is/are rejected.
- 7) ☒ Claim(s) 5-9 is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Nov 28, 2000 is/are a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED ACTION

Drawings

1. Figures 1, 1A and 1B should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). These figures are discussed in the background section of the specification.
2. The drawings are objected to because Figs. 1 and 1A appear to be identical, albeit they have different captions. Fig. 1 is not referred to in the specification at all.
3. Fig. 4 appears to be identical to Fig. 2, albeit they have different captions.
4. There appears to be a notation on sheet 5 of the drawings (perhaps from the inventor); this, along with the address that appears there, should be deleted.
5. Although there appears to be a Fig. 9, this is not listed in the list of figures.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

6. The disclosure is objected to because of the following informalities:
 - (i) Fig. 1 is not listed in the list of drawings on page 7 of the specification. Either the figure should be listed, or else it should be deleted.

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(ii) On page 3, line 6, reference is made to Schottky diodes (with upper case S), but on lines 11 and 19 (and in page 4 as well) the diodes are referred to schottky diodes (with lower case s). Consistent use throughout the disclosure is required.

(iii) In the Brief Description of the Drawings on page 7, Fig. 4 is said to a “functional block diagram of a desired new function...” But, this appears not to be the case. As noted in paragraph 3 above, Fig. 4 appears to be identical to Fig. 2.

(iv) The Brief Description of the Drawings on page 7, lists Figs. 5A and 5B; these figures do not exist.

Appropriate correction is required.

Claim Objections

7. Claims 12 and 13 objected to because of the following informalities:

In claim 12, the recitation in lines 4 and 5 lacks clarity and precision; MPEP § 2173.02. The recitation appears to be specifying a condition in terms of a “current” when it is reduced below a “threshold voltage.” If what is of concern is a voltage, then what is the relevance of the “current threshold detector” recited in line 3?

The recitation “said secondary side” in line 7 of claim 13 lacks antecedent basis. While a “secondary winding” has been recited in line 4, this is not the same as a secondary side.

Appropriate correction is required.

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Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 2 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by *Porter et al.*

Regarding claim 2, *Porter et al.* discloses an AC/DC converter (Fig. 3-3) comprising: a transformer (left-hand side of the Fig. 3-3) having a primary side for inputting an input signal (left) and a secondary side for outputting an output DC signal (right, Fig. 3-3); and a synchronous rectifier controller (304, Fig. 3-3; and column 22, lines to column 23, line 1) connected only to circuits on said secondary side (Fig. 3-3) for controlling a synchronous rectifier (SR) switch (SR1) on said secondary side for generating said DC output signal (right-hand side of Fig. 3-3).

Regarding claim 13, *Porter et al.* discloses a synchronous rectifier controller for an AC-to-DC converter (Fig. 3-3) wherein: said synchronous rectifier (304) controller connected to only to circuits on a secondary winding of a transformer (Fig. 3-3) of said AC-to-DC converter and

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responding to a voltage of secondary winding for controlling a synchronous rectifier (SR) switch (304) of said secondary side for generating a DC output signal.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 3, 10, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Porter et al.*, in view of *Gold et al.*

Regarding claims 3 and 14, which depend respectively on claims 2 and 13, as noted above *Porter et al.* discloses all of the limitations in the latter claims.

Porter et al. does not expressly disclose that the SR switch is a MOSFET transistor having a gate connected to said synchronous rectifier controller.

Gold et al. discloses a controller for a power conversion system (title; and abstract) in which the synchronous rectifier (SR) switch is a MOSFET transistor (20, Fig. 2; 22 to 27, Fig. 3; column 6, lines 53-54; and) having a gate connected to said synchronous rectifier controller (Fig. 2, column 6, lines 54-58; and Figs. 3 and 6, column 6, line 59 to column 7, line 2).

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At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teaching of *Gold et al.* with the synchronous rectifier circuit of *Porter et al.* and to have used MOSFET switches, for the purpose of increasing speed-of-response and reliability.

Regarding claims 10 and 15, which depend respectively on claims 3 and 14, as noted above *Porter et al.* and *Gold et al.* disclose all of the limitations in the latter claims.

Gold et al. also discloses that the SR switch (20, Fig. 2 and 22-27, Fig. 3) is a N-channel MOSFET transistor (column 7, lines 34-35) having a gate (22a-27a, Fig. 3) connected to said synchronous rectifier controller for turning off said MOSFET (column 7, lines 1-2) when a drain of said N-channel MOSFET transistor is driven high (column 7, lines 5 ff).

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teaching of *Gold et al.* with the synchronous rectifier circuit of *Porter et al.* and to have used N-channel MOSFET switches, since these are suitable for low-voltage, high-current applications such as computer power supplies.

12. Claims 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Porter et al.*, in view of *Rozman*.

Regarding claim 4, *Porter et al.* discloses all the limitations of claim 2 on which claim 4 depends.

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Porter et al. does not disclose that the synchronous rectifier further comprises a plurality of circuit elements for turning off said SR switch before a main switch driving said transformer on and for turning on said SR switch when the main switch of said transformer is turned off.

Rozman discloses a synchronous rectifier (title; abstract; and column 1, lines 12-16) that comprises a plurality of circuit elements (Figs. 1 and 3) for turning off said SR switch before a main switch (101, Fig. 3) driving said transformer on and for turning on said SR switch (105) when the main switch of said transformer is turned off (column 3, lines 27-29 and 53-54; and column 2, lines 52 ff)..

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teaching of *Rozman* with the synchronous rectifier circuit of *Porter et al.* for the purpose of improved switching efficiency (*Rozman*; column 1, lines 20-30).

Regarding claim 11, *Porter et al.* discloses all the limitations of claim 2 on which claim 11 depends.

Porter et al. does not disclose that the synchronous rectifier controller comprises an voltage clamp waveform clipper connected to an output of the secondary winding of said transformer for providing a square waveform corresponding to the output of said secondary winding.

Rozman discloses a synchronous rectifier (title; abstract; and column 1, lines 12-16) that comprises an voltage clamp waveform clipper (Fig. 3; and column 3, lines 17-21) connected to an

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output of the secondary winding of said transformer for providing a square waveform (Fig. 4) corresponding to the output of said secondary winding (column 3, lines 54 ff).

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teaching of *Rozman* with the synchronous rectifier circuit of *Porter et al.* for the purpose of improved efficiency (*Rozman*; column 4, lines 1-4).

13. Claims 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Porter et al.*, in view of *Boylan et al.*

Regarding claim 12, which depends on claims 2, as noted above *Porter et al.* discloses all of the limitations in the latter claim.

Porter et al. does not expressly disclose that the said synchronous rectifier controller further comprises a current threshold detector connected to an output of a secondary winding of said transformer for sensing and turning off said SR switch when the current output of said secondary winding is reduced below a threshold value.

Boylan et al. discloses a circuit for controlling a synchronous rectifier (title; and 330, Fig. 3) in which the synchronous rectifier controller (Fig. 3) further comprises a current threshold detector (365) connected to an output of a secondary winding (335) of said transformer for sensing and turning off (column 7, lines 49-50) said SR switch (SR1) when the current output of said secondary winding is reduced below a threshold value (375; and column 7, lines 44-46).

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At the time of the invention, it would have been obvious for a person of ordinary skill in the art to have combined the teaching of *Boylan et al.* with the synchronous rectifier circuit of *Porter et al.* for the purpose of efficient control of the rectifier.

Allowable Subject Matter

14. Claim 1 is allowed.

15. Claims 5-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

16. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1, prior art does not disclose a synchronous rectifier control circuit comprising a means for generating a dead time, a pulse differentiator, a voltage-ramping means and a charge integrator, in the combination claimed.

Regarding claim 5, prior art does not disclose a synchronous rectifier comprising a dead-time means, in the combination claimed.

Regarding claim 6, prior art does not disclose a synchronous rectifier comprising a pulse differentiator, in the combination claimed.

Regarding claim 7, prior art does not disclose a synchronous rectifier comprising a voltage-ramping means, in the combination claimed.

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Regarding claims 8 and 9, prior art does not disclose a synchronous rectifier comprising a charge integrator, in the combination claimed.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

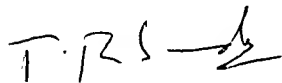
Faulk discloses a switch-made power converter with a DC output.

Vinciarelli discloses a converter which is controlled from the secondary side of the transformer (Fig. 4a).

Jain discloses a AC/DC converter topology suitable for low-voltage, high-current applications.

Diallo et al. discloses a self-regulated synchronous rectifier.

18. Any inquiry concerning this communication should be directed to Dr. T. R. (Joe) Sundaram at telephone number (703) 308-6821. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, N. Le can be reached at (703) 308-0750.



T. R. Sundaram

March 19, 2003



N. Le
Supervisory Patent Examiner
Technology Center 2800